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The geology given is naturally largely of a mineralogical nature, though the possible effects of uplift and erosion were partially comprehended. The following description of the marble beds of Swedes Ford, Pennsylvania, is characteristic:

> These strata, resting one upon another almost perpendicularly, are very clearly distinguished by divers rifts and clefts as well as by changed colors. This can scarcely have been their original bearing; rather it is likely they have suffered a powerful alteration in their bed.

Copious notes are given on the mineral resources, together with descriptions of mines and remarks on the condition of the metallurgical industry and the effects of tariff legislation. The need of a "trust buster" was evidently manifest even at that early date. Concerning an unsuccessful attempt to check imports by high duty on the part of the iron workers of New Jersey and Pennsylvania we are informed:

> Therefore several of the larger furnace and forge masters proposed to hinder the further import of foreign iron by coming to an agreement among themselves that whenever iron came in from Europe they would offer their own at a certain loss under the prices of the European merchants so as to frighten them off from further imports.

The volumes are of convenient size, good paper and type, and the rendering into English well done. It is a work which those interested in the beginning of science, or the early history of the country may peruse with pleasure and which all may read with profit. One can but hope that it will meet such a reception as may lead to a like rendering by Dr. Morrison of the "Beytrage" above mentioned.

GEORGE P. MERRILL

THE INTERCOLLEGIATE GEOLOGICAL EXCURSION

THE eleventh Intercollegiate Geological Excursion, though it began on "Friday the 13th," was blessed with perfect weather and the attendance was over 70. We regretted the absence of Professor William Morris Davis (to whom a greeting was sent) and Secretary Professor Cleland (detained at the last moment) yet the presence of Dr. C. A. Davis, the peat expert of the Bureau of Mines, and David White, from Washington, and a delegation headed by Professor Chadwick from St. Lawrence University, helped to make up. The state geologists of Connecticut, Rhode Island and Vermont (there is none in Massachusetts) were present and members of the faculties of Dartmouth, Vermont, Amherst, Smith, Mt. Holyoke, Yale, Worcester, Boston and Salem Normals, as well as the immediately adjacent institutions of Harvard, Tech. and Wellesley. Professor Lane, of Tufts, had charge of the excursion.

Starting Friday noon from Davis Square, Somerville, at Morrison Avenue a diabase dike ridge of La Forge's "Older" E.W. family was visited, then at the corner of Francesca Avenue was a temporary exposure showing the Somerville slates beautifully glaciated and the preglacial weathering not entirely removed, a north striking camptonite dike with brotocrystals of biotite and an older labradorite porphyrite. Then near the old powderhouse the diabase with quartzite inclusions was shown on the terraces and its peculiar spheroidal weathering. This was visited again at Governor's Avenue in Medford and unpublished analyses by C. N. Whitney, showing that the weathering is largely oxidation and hydration without leaching, were shown that evening by Professor Lane, who called attention to the fact that the phosphorus seemed higher in the weathered material and thought that the weathering was in some ways like that of an arid region. He also said that his studies[1] showed that if the consolidation temperature was something like 1100° C., the initial temperature was near 2000°. Thence passing along Broadway, hills and drumlins were being cut away, showing rock core, with accumulation of the till on the lee side exhibiting also some sign of nipping by an old ocean shore 35 feet above the present level.

On Simpson Avenue (Nos. 69 and 31) in temporary excavations for cellars, sections of washed gravel were exposed—largely an

[1] "Die Korngrösse der Auvergnosen."

overwash gravel plain from the ice but a boulder of the weathered diabase and an unconformity were seen—the upper layer being more oxidized and leached, the lower showing more cross-bedding with a considerable amount of hornblende with the quartz, suggesting a beach deposit lying on top of the gravel plain. At No. 69 the underlying slate, *not* smooth and glaciated, was shown.

At the Holland St. quarry Professor Palache showed veins (confined almost to the diabase) in which calcite, quartz, siderite and almost microscopic anatase and other minerals have been found.

Passing over College Hill other sections of till above the 35-foot line and of shearing and jointing in the slate, which on Quincy Street dips nearly vertically and has numerous small faults, were shown. The extensive view from the reservoir shows the peneplain of the Middlesex Fells, the lower land of the Boston Basin, the glacial outwash gravel plain of Arlington, a quarry on the Fellsway in felsite with calcite and specular hematite and barite in veins (later visited), the drowned valley of the Mystic with its salt peat marshes and numerous drumlins. Descending to this valley Dr. Davis pointed out the freshening of the *Spartina patens* salt marsh indicated by the invasion of various fresh water plants. This has all happened in three or four years while the dredge has thrown up signs of fresh water peat at a considerably lower level than the sea level.

Next were visited the Medford diabase weathering on Governor's Avenue and Fellsway quarry and the Wellington clay beds. Here were found two distinct beds of clay with a sand layer between, and above a bed of gravel which Gulliver showed by the per cent. of angular pebbles was undoubtedly glacial outwash. Barton called attention to faulting in the sand and cementing of the sand into sandstone and conglomerate. The Mystic valley is, then, largely filled by this gravel plain and on top of it is the marsh deposit of irregular thickness, sometimes not very deep. In other hollows of the gravel plain we find (*a*) fresh water peat, with sticks and leaves, 10 feet; (*b*) fresh water swamp bed with stumps; (*c*) brackish water swamp, 1 ft.; (*d*) thin high tide *Spartina patens* salt water deposit. Stumps of a former pine forest were very conspicuous near the margin and were connected with a fresh water peat layer pointed out by Professor Davis, on which grew a salt marsh. The evidence that this pine forest had been invaded by the salt marsh was not challenged by any one and the freshness of the pine stumps showed that it was relatively recent, as D. White emphasized.

Professor D. W. Johnson, however, pointed out in the discussion which took place that evening in the Barnum Museum at Tufts College that certainly at Scituate and in some other cases such invasion of salt marsh was due to an increase in tidal range without any subsidence of the land, and that if the tidal range outside a barrier beach was, say 20 feet, in going up a stream that range would gradually diminish, so that if a beach were broken through, or driven back, *or in any way the access of water made more free, the increase in tidal range would take place and produce an effect of apparent subsidence, while mean sea level might not differ.*

The same evening Professor Fernald, of Harvard, gave an interesting account of the flora of Newfoundland,[2] which while it has Labrador and Polar plants, has very few of the Canada flora only seventy miles away across the Gulf of St. Lawrence but has a large percentage of plants of the sandy southern coastal plain from Cape Cod south. There is a bar between Newfoundland and Cape Cod which might have been uncovered when the water of the ice sheet was taken from the ocean.

Professor Johnson gave the account of the development of Nantasket which had already been visited in an earlier excursion[3] and pointed out with very strong argument that the level had remained fixed within a couple of feet for over a thousand years—probably several thousand—derived therefrom. He also

[2] Described in the July *Rhodora*.

[3] Science, 1906, p. 155.

reviewed some of his recent observations along the Atlantic and European coasts. He emphasized the point not often brought out that most of our evidence of subsidence is referred to high tide, and that a change in the range of tide may show apparent subsidence.

Professor Davis was not able to agree with Johnson. He had found sections of as much as twelve feet of salt water peat formed mainly of *Spartina patens* which only occurs a few inches below high tide and is replaced by fresh and brackish water forms with a very slight elevation, and if the exposure to salt water amounts to more than a couple of hours a day is replaced by another species—*Spartina glabra*. The occurrence of such deposits composed almost exclusively of *Spartina patens* from top to bottom seemed to him to prove almost conclusively a steady subsidence and he presented a bit of evidence for the first time as to the rate thereof. The upper layers of marshes at Neponset and Revere crossed by the railroad show for the upper three inches more or less of the peat particles of cinder from the locomotive so that there appears to have been accumulation of something like three inches in the last fifty years or so.

On Saturday the ferry across Boston Harbor gave an opportunity to see the general physiographic location of the Navy Yard bench mark which according to Freeman shows subsidence. This is explained by Johnson as presumably due to a higher range of tide owing to the filling of the Back Bay, etc., which once led off the waters. The question as to the effect of wharves and embankments on the high tide was discussed.

The train gave very good views of sections of drumlins and at Revere Beach, the site of Cherry Island (now entirely washed away) was noted, and the peculiar scallops on the shore. These are explained by Johnson and Lane as due to the waves taking advantage of irregularities and in breaking making sidewise fountains, as they may be called, which extending laterally have a limit of breadth depending on the height and size of the waves. On the back side of Revere Beach the once forested swamp showed stumps and on top a salt marsh turf. New ditches showed the section of the turf and the creeks which drained the marsh showed how sensitive to level the flora was, because in any small depression there was the *Spartina glabra* while on the knolls around the stumps was a more complicated flora with goldenrod and asters creeping in. The salt water peat had a strong odor of sulphureted hydrogen and the darker peat at the bottom showed brackish water formations.

Around Oak Island (a large group of trees slightly above tide level) no rim of stumps was seen as would be expected, except a few poorly preserved stumps of oak and hickory. The salt peat was shown to contain only the roots and underground parts of the plant, not the leaves and aerial parts as the fresh water marshes because they were swept bare by the tide. Beneath this part of the marsh was about 9 feet of salt water peat in general and in order to explain it as not due to continuous subsidence Professor Johnson had to explain it as due to subsidence of several feet several thousand years ago followed by an apparent subsidence of a foot or two more recently due to the changes of the run of tide. The objection to this was that no marked break was found as might be expected.

In a partly cut away drumlin Professor Perkins recognized some boulders, similar to the Vermont red sandstone, which may be of Cambrian age.

On the way from Revere Beach to Nahant a brief stop enabled one to see the ripple marks and rills and other phenomena of the Lynn Beach.

At Nahant was visited another salt marsh which is fourteen feet deep with two feet of sedge and twelve of salt marsh peat. On the golf links relics of stumps were again visible. The beach connecting Bass Point showed the high water scallops once more and Professor Johnson gave an account of their formation and some experiments he had made in producing artificial scallops.[4] At low tide this beach is said to show peat passing under it and Professor Johnson explained such peat

[4] See *Geol. Soc. Am. Bulletin*, Vol. 21, pp. 599–624.

found out under the waves, by consolidation and depression as the barrier beach worked over them, describing a place where wagon tracks occurred. Of course, Professor Johnson does not deny that there has been subsidence and peat formed at lower levels, but probably several thousand years ago.

After dinner Professor Lane took charge of one party (while others studied the peat) and showed typical gabbro and various diabase dikes. He called attention to the basaltic columnar structure of some of these dikes and also a jointing which enabled one to obtain the dip of the main gabbro mass itself. Bass Beach and Canoe Beach both offered excellent opportunity to see the beach scallops in formation. Passing on to Pulpit Rock the finer grain of the gabbro near the contact was noticed and its contact with siliceous and argillaceous limestones changed to epidote and garnet rocks and black basanite. Some of the party found Hyolithes while others passing back along the north shore of the island had a good chance to observe the differentiation of the gabbro into a salic or syenitic phase (which Professor Lane called a gabbro aplite) and a dark peridotic phase near Black Mine. There were numerous other points of interest which attracted some of the crowd (which gradually dispersed) such as faults and the comparison of the rounding of the pebbles with those of the overwash gravel plain.

E. H. & A. C. L.

SPECIAL ARTICLES

A NEW MINNOW FROM COLORADO

A SMALL fish collected by Mr. Horace G. Smith at Julesburg, Colo., has been the occasion of much correspondence and discussion, but may now be brought forward as apparently undescribed.

Notropis horatii n. sp.

Type. Length 58 mm., to base of caudal 47; depth 9 mm., width 5½; D. 8, A. 9; scales 5 or 6—38 to 40—4; dorsal region clear ferruginous, with a fine dusky band; a rather broad lateral silvery band; scales of lateral line with little dark spots, as in *N. telescopus;* fins yellowish-white, no spot on dorsal or caudal; front of dorsal to base of caudal 24 mm., to end of snout 23; dorsal fin beginning a little *anterior* to level of pelvic; region before dorsal not bare of scales. Scales with 9 apical radii.

This was supposed to be *N. piptolepis* (Cope) or *N. gilberti* Jordan & Meek, these two names being considered by Drs. Evermann and Kendall probably synonymous. At the U. S. National Museum I found the type of *N. gilberti,* which proves to be very distinct, as follows:

1. *N. gilberti,* type. Diameter of eye 3.9 mm., snout beyond eye 3; depth of head 7.35 mm.; snout to base of caudal 39; beginning of dorsal level with beginning of ventral; no dark dorsal band; ventral scales exceedingly broad.

2. *N. horatii,* type. Diameter of eye 3, snout beyond eye 3.4; depth of head 6.35 mm.; snout to base of caudal 45.5; beginning of dorsal in front of beginning of ventral; a dark dorsal band; ventral scales ordinary.

Both have a silvery lateral band; the dorsal area of *gilberti* is darker and redder. The dorsal profile of head and anterior part of body in *horatii* is practically flat. The corners of the mouth in *horatii* are a little anterior to the level of front of eye.

The question now arises whether the fish can be *N. piptolepis,* to which it runs in my table of Colorado Cyprinidæ (Univ. of Colo. Studies, Vol. V., No. 3). The type of *piptolepis* seems to be lost, as it was not found at the National Museum, and Fowler does not list it in his account of the species in the collection at Philadelphia. Possibly the name may have to be given up as undeterminable, but we have a mason-jar full of a species collected in Boulder Creek by Juday, recorded by him as *piptolepis* and accepted as such by me. This fish is certainly quite distinct from *horatii,* and I believe it to be Cope's species. Although *N. horatii* is doubtless of the immediate alliance of *piptolepis* and *gilberti,* it is superficially very like *N. stilbius* and *N. telescopus,* in another group. The species is